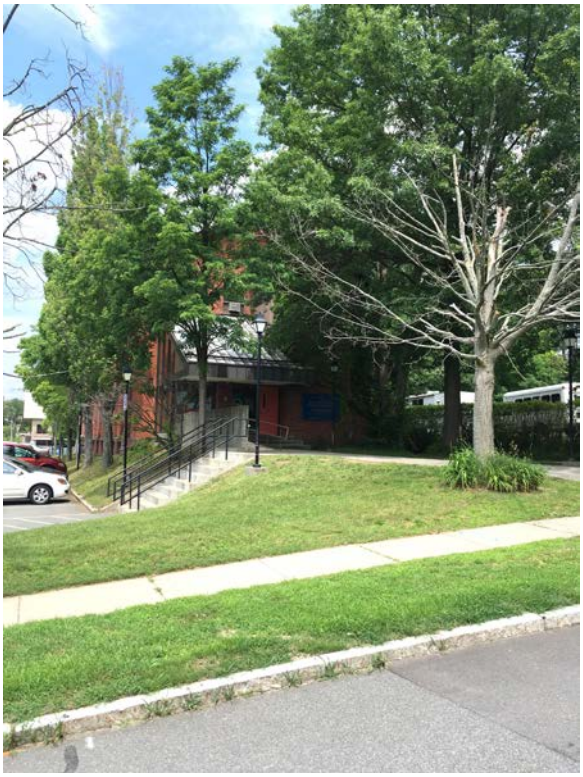
INDOOR AIR QUALITY ASSESSMENT

Department of Mental Health
13 Prospect Street
Greenfield, MA



Prepared by:
Massachusetts Department of Public Health
Bureau of Environmental Health
Indoor Air Quality Program
July 2017

BACKGROUND

Building:	Department of Mental Health (DMH)
Address:	13 Prospect Street, Greenfield, MA
Assessment Requested by:	Deborah Coleman, Facilities Director, Executive Office of Health and Human Services (EOHHS)
Reason for Request:	Occupational Safety and Health Administration (OSHA) complaint/referral regarding mold in basement
Date of Assessment:	June 23, 2017
Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) Staff Conducting Assessment:	Mike Feeney, Director, Indoor Air Quality (IAQ) Program
Date Building Constructed:	Late 1800s, renovation 1990s-2000s
Building Description:	Constructed as a brick building

METHODS

Please refer to the IAQ Manual for methods, sampling procedures, and interpretation of results (MDPH, 2015).

RESULTS and DISCUSSION

The following is a summary of indoor air testing results (Table 1).

- ***Carbon dioxide*** measurements were above the MDPH recommended level of 800 parts per million (ppm) in all but 9 areas surveyed, indicating inadequate air exchange in most of the building.
- ***Temperature*** was within the MDPH recommended range of 70°F to 78°F in all areas surveyed.

- ***Relative humidity*** was within or close to the MDPH recommended range of 40 to 60% in all areas tested.
- ***Carbon monoxide*** levels were non-detectable (ND) in all areas tested.
- ***Particulate matter (PM2.5)*** concentrations measured were below the National Ambient Air Quality (NAAQS) level of 35 $\mu g/m^3$ in all but two areas tested. Outdoor levels were above the NAAQS the day of assessment.
- ***Volatile Organic Compounds*** concentrations were ND in all areas tested.

Ventilation

It is important to note that the building is not equipped with a full mechanical heating, ventilating and air-conditioning (HVAC) system. The sole source of ventilation in the building is openable windows. Air-conditioning (AC) is provided by window-mounted units. The lobby, hallways and large conference rooms are equipped with a ducted HVAC system that provides heating and cooling, but does not have a fresh air intake.

Microbial/Moisture Concerns

As stated, concerns about mold in the basement prompted this assessment. Basement offices are constructed of gypsum wallboard (GW) covered in vinyl wallpaper. All GW installed along the exterior wall of the building was removed, exposing the foundation wall (Picture 1). GW installed below grade along the foundation has a tendency to become moistened by water penetrating through the wall. With the removal of this GW, the basement was found free of mold/musty odors.

The base of the brick foundation wall was found moistened, likely from water penetration from pooling water against the building due to a lack of a gutter/downspout system along the roof.

Both doors accessing the basement have spaces that allow for basement air to enter the stairwells/foyer (Picture 2). These breaches can provide pathways for drafts, moisture and odors into other parts of the building.

Windowsills were examined in offices. Vinyl wallpaper had become detached from the wall along windows with ACs, indicating water penetration, likely during wind-driven rain events. In some cases, the wallpaper paste had become colonized with mold (Picture 3).

Indoor plants were noted in some areas. Plants can be a source of pollen and mold, which can be respiratory irritants to some individuals. Plants should be equipped with non-porous drip pans. Plants should also be located away from ventilation sources to prevent the entrainment and/or aerosolization of dirt, pollen, or mold.

Water coolers were observed on carpeted areas. Spills or leaks from these appliances can moisten carpeting. They should be located in a non-carpeted area or on waterproof mats.

Ivy was observed on the building's exterior (Picture 4). Roots growing into the brick mortar can create fissures, which can cause crumbing and deterioration of the building exterior due to freezing and thawing of water trapped in these spaces. Over time, water can enter the building through damage to the exterior wall.

Other IAQ Evaluations

A number of occupied offices contain wall-to-wall carpeting. First floor offices have carpeting that is likely at least 30 years old. The average service life of carpeting is approximately eleven years (Bishop, 2002). It was unclear if the building has a regular carpet cleaning program. The Institute of Inspection, Cleaning and Restoration Certification (IICRC), recommends that carpeting be cleaned annually (or semi-annually in soiled high traffic areas) (IICRC, 2012).

CONCLUSIONS/RECOMMENDATIONS

As noted in a letter dated May 3, 2012 (Appendix A), a recommendation to discontinue use of the basement for storage was made. Based on this letter, no building occupants from upper floors should have materials stored in the basement and have no reason to access the basement. Due to the conditions observed at the time of this assessment, the following recommendations are provided.

1. Limit access to the basement to facility management only. Change locks on basement access doors.

2. Install door sweeps and weather-stripping on stairwell and lobby access doors.
3. Remove water-damaged wallpaper around windows.
4. Consider replacing the carpets in offices on the first floor.
5. Render window-mounted ACs as watertight as feasible to prevent water penetration during driving rain.
6. Consider installing a gutter/downspout system to the roof edge.
7. Remove ivy from exterior brick walls.
8. Reduce/eliminate odorous products in office space.
9. For buildings in New England, periods of low relative humidity during the winter are often unavoidable. Therefore, scrupulous cleaning practices should be adopted to minimize common indoor air contaminants whose irritant effects can be enhanced when the relative humidity is low.
10. Use a vacuum cleaner equipped with a high efficiency particulate arrestance (HEPA) filter in conjunction with wet wiping to remove dust from all surfaces. Avoid the use of feather dusters.
11. Consider reducing the number of plants. Indoor plants should be properly maintained and equipped with drip pans to prevent water damage to porous building materials and be located away from ventilation sources to prevent the aerosolization of dirt, pollen or mold.
12. Replace carpeting that has exceeded its useful life (e.g., > 11 years).
13. Drinking water during the day can help ease some symptoms associated with a dry environment (throat and sinus irritations).
14. Refer to resource manual and other related indoor air quality documents located on the MDPH's website for further building-wide evaluations and advice on maintaining public buildings. These documents are available at http://mass.gov/dph/iaq.

REFERENCES

Bishop, J. 2002. Institute of Inspection, Cleaning and Restoration Certification.: A Life Cycle Cost Analysis for Floor Coverings in School Facilities.

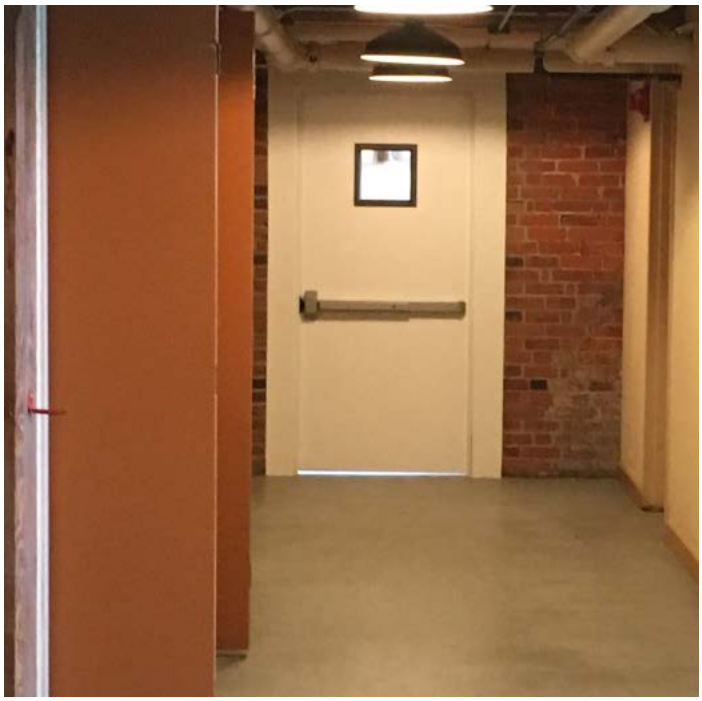
IICRC. 2012. Institute of Inspection, Cleaning and Restoration Certification. Carpet Cleaning: FAQ. Retrieved from http://www.iicrc.org/consumers/care/carpet-cleaning.

MDPH. 2015. Massachusetts Department of Public Health. “Indoor Air Quality Manual: Chapters I-III”. Available from http://www.mass.gov/eohhs/gov/departments/dph/programs/environmental-health/exposure-topics/iaq/iaq-manual/

Picture 1

Foundation wall with removed GW

Picture 2



Space under basement access door

Picture 3

Water-damaged wallpaper

Picture 4

Ivy on exterior of building

Location: Department of Mental Health

Address: 13 Prospect Street, Greenfield, MA

Indoor Air Results

Date: 6/23/2017

Table 1

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m^3)	Occupants in Room	Windows Openable	Ventilation		Remarks
								Intake	Exhaust	
Background	433	ND	82	78	82					
101	744	ND	76	59	20	0	N	N	N	AC, plants
102	948	ND	75	53	34	0	N	N	N	Carpet-old, AC
103	834	ND	76	56	32	0	Y	N	N	AC-on, wall paper-mold
104	1029	ND	77	55	34	1	Y	N	N	AC-on
106	769	ND	76	52	30	0	N	N	N	
108	707	ND	76	50	31	0	Y	N	N	AC
110	751	ND	76	54	40	1	Y	N	N	AC
111	767	ND	76	60	32	0	N	N	N	AC
112	893	ND	77	52	39	3	Y	N	N	AC, plants
Reception	787	ND	76	52	27	0	N	Y	Y	

ppm = parts per million µg/m = micrograms per cubic meter ND = non detect AC = air conditioner

Comfort Guidelines

Carbon Dioxide: < 800 ppm = preferred
> 800 ppm = indicative of ventilation problems

Temperature: 70 - 78 °F
Relative Humidity: 40 - 60%

Location: Department of Mental Health

Address: 13 Prospect Street, Greenfield, MA

Indoor Air Results

Date: 6/23/2017

Table 1 (continued)

Location	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	Temp (°F)	Relative Humidity (%)	PM2.5 (µg/m^3)	Occupants in Room	Windows Openable	Ventilation		Remarks
								Intake	Exhaust	
201	854	ND	75	44	27	0	N	N	N	AC
202	936	ND	76	45	27	0	Y	N	N	AC
203	828	ND	75	43	26	0	N	N	N	AC
204	854	ND	75	42	26	0	N	N	N	AC
205	1101	ND	75	43	25	0	N	N	N	AC, plants
206	972	ND	76	42	27	0	N	N	N	AC
207	933	ND	76	42	27	0	Y	N	N	AC, water-damaged carpet
208	787	ND	74	44	30	0	Y	N	N	AC on, window open
209	772	ND	74	51	28	0	N	N	N	AC, plants
210	800	ND	75	49	29	0	N	N	N	AC
211	801	ND	75	50	31	0	N	N	N	AC

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								Intake	Exhaust	
212	796	ND	75	49	32	0	N	N	N	
2nd floor reception	817	ND	74	49	30	2	N	Y	Y	Plants
301	835	ND	74	48	27	0	Y	N	N	AC, plants
302	919	ND	77	39	22	0	Y	N	N	AC Plants
303	926	ND	76	42	21	0	N	N	N	AC
303A	850	ND	75	44	22	0	N	N	N	AC
303B	868	ND	75	40	20	0	Y	N	N	AC
304	1055	ND	75	41	21	1	Y	N	N	AC
305	959	ND	75	42	23	1	Y	N	N	AC on
Conference room	853	ND	75	37	20	0	Y	N	N	AC
307	851	ND	71	36	22	0	N	N	N	AC

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								Intake	Exhaust	
308	852	ND	72	42	21	0	Y	N	N	AC
Photocopier	870	ND	73	45	21	0	N	Y	Y	AC, photocopier
TDP	907	ND	74	48	23	0	N	N	N	AC, plants
309	888	ND	74	46	25	1	N	N	N	AC, plants
Reception	914	ND		44	24	1	N	Y	N	

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Comfort Guidelines

Carbon Dioxide:	< 800 ppm = preferred	Temperature:	70 - 78 °F
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The Commonwealth of Massachusetts
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Department of Mental Health
Central – West Area

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May 3, 2012

Joe Henefield
Director of Real Estate
Service Net
129 King Street
Northampton, MA 01060

RE: Indoor Air Quality Findings

Joe,

I have written a brief summary stating the findings from the Indoor Air Quality (IAQ) Report that was prepared by Environmental Compliance Service(ECS) on March 16, 2012 on the Sitterly Building located at 13 Prospect Street, Greenfield.

Indications of water intrusion were observed throughout the basement, especially associated with the westerly elevations of building envelope system. The IAQ survey and its findings were conducted and formulated using standards of care as required recognized as industry standard. The IAQ report indicated the results for carbon dioxide, temperature, relative humidity, VOC's carbon dioxide and carbon monoxide meet the ASHRAE recommended guidelines for indoor air. ECS noted signs of water intrusion associated with the basement window on the west side of building. The visual signs of water intrusion were delaminating wall paper, visible mold growth and water staining below and around several windows.

ECS has recommended an evaluation of the building envelope to pinpoint the exact source of water intrusion and to develop a strategy to properly seal the envelope in an effort to stop continued water infiltration and subsequent damage.

NOTE: Volatile Organic Compounds (VOC's) are chemicals used to manufacture and prepare many building materials, interior furnishings, office equipment, cleaners,

personal care supplies and pesticides. There are no standards set for VOC's in industrial settings; however exceedances of these can lead to potential odor problems or an unsafe environment. Based upon the findings of this report it is highly advisable to mitigate formaldehyde that is present at high levels. It was noted in several of the rooms located on the westerly side of the basement that these rooms are being used as a storage area. Tape lift sampling was collected from materials located in this room and mold growth was confirmed on all bulk samples.

Due to the findings referenced above I am requesting that the rooms located on the westerly side of the basement no longer be used as a storage area for the reasons stated above until further notice. I will also make reference in the License to Occupy Space agreement. The rooms noted on the LTO are as follows: 62, 63, 64, 65, 66, and 67.

I have deferred this matter to our Central Office Facility Mgt Director. We most likely will need to consult with a structural engineer for guidance to receive instruction on how to handle this issue. I will keep you posted on further development.

Please feel free to call if you have any questions or concerns.

Regards,

Rae Ann Frenette
Director of Property Management

Cc: Tom Moriarty